

# Math 157 - Quiz 12

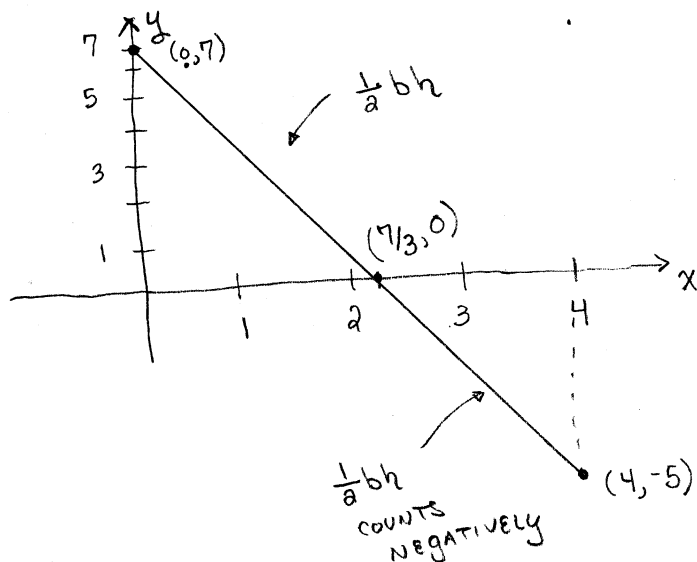
November 30, 2016

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Use the area concept to evaluate  $\int_0^4 (-3x + 7) dx$ .



$$= \frac{1}{2} \left( \frac{7}{3} \right) (7) - \frac{1}{2} \left( 4 - \frac{7}{3} \right) (5)$$

$$= \frac{49}{6} - \frac{25}{6} = \boxed{4}$$

2. (2 points) Use the Fundamental Theorem of Calculus to evaluate  $\int_0^1 (4x + e^{2x}) dx$ .

$$= 2x^2 + \frac{1}{2} e^{2x} \Big|_0^1$$

$$= \left( 2 + \frac{1}{2} e^2 \right) - \left( 0 + \frac{1}{2} \right)$$

$$= \boxed{\frac{3}{2} + \frac{1}{2} e^2 \approx 5.1945}$$

3. (2 points) Use a right sum over 5 subintervals to approximate  $\int_1^2 \ln x \, dx$ . Then use fnInt to approximate the integral.

$$\Delta x = \frac{2-1}{5} = 0.2 \quad 1 < \overset{*}{1.2} < \overset{*}{1.4} < \overset{*}{1.6} < \overset{*}{1.8} < \overset{*}{2}$$

$$\begin{aligned} \text{Right sum} &= 0.2 \left[ \ln 1.2 + \ln 1.4 + \ln 1.6 + \ln 1.8 + \ln 2 \right] \\ &= 0.2 \ln(9.6768) \approx \boxed{0.45395} \end{aligned}$$

$$\text{fnInt}(\ln x, x, 1, 2) = 0.38629\dots$$

4. (3 points) If  $f(x) \geq g(x)$  on  $[a, b]$ , then the area between the graphs of  $f$  and  $g$  over  $[a, b]$  is given by  $\int_a^b [f(x) - g(x)] \, dx$ . Use this idea with the Fundamental Theorem of Calculus to determine the area between the graphs of  $y = x^2$  and  $y = x^3$  on the interval  $[0, 1]$ .

$$\begin{aligned} \int_0^1 (x^2 - x^3) \, dx &= \left. \frac{1}{3} x^3 - \frac{1}{4} x^4 \right|_0^1 \\ &= \frac{1}{3} - \frac{1}{4} = \boxed{\frac{1}{12}} \end{aligned}$$